104165

Nozzle Flame Holding Characterization

FINAL REPORT

PIs: Tim Lieuwen and David Scarborough

School of Aerospace Engineering
Georgia Institute of Technology
Atlanta, GA 30332-0150

The experimental setup was built and assembled in the Aerospace Department. The SS 316 box was placed on a stand and wrapped in insulation so that high temperature preheat could be achieved. Moreover, multiple air inlets were used in order to achieve uniform air supply to the GE 9FBA nozzle. Air and natural gas/methane were supplied from the building systems using orifices and control valves. Ignition was achieved using a GE manufactured H_2 torch.

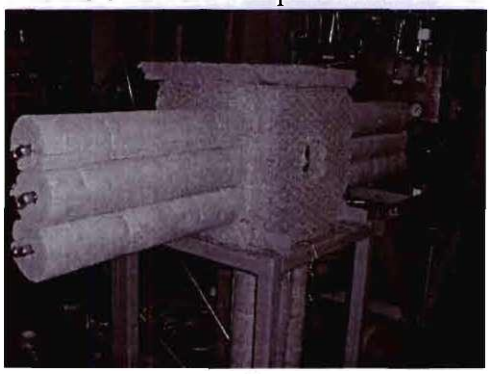

Figure 1: Experimental setup.

The testing for this project was performed in conjunction with GE personnel. All data was recorded by their engineers so that all information was in their possession. We took images of flame holding and colorized them (represented in Figure 2) for various nozzle velocities in the temperature range of 780-850F. Typical mass flow rate of air was 0.18 to 0.45 lb/s. Methane was the only fuel used because it was not necessary to dope with ethane to get images of the occurrence they desired. We also added the capability to vary the inner and outer fuel split ratio so that GE could determine which fuel ports were causing the flame holding problem. Again, all data and images were taken by the GE engineers and examined. None of the data processing (other than image colorization) was performed at Georgia Tech.

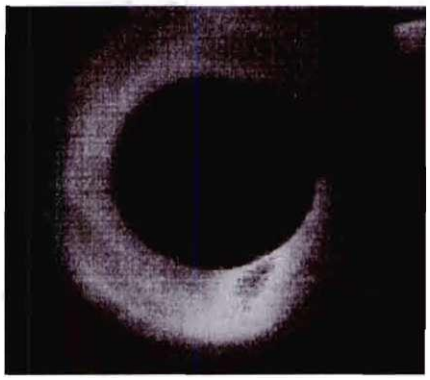

Figure 2: Example of Images for 9FBA GE Nozzle Test.